

Cracks in Portland Cement Plaster (Stucco)

Portland cement plaster is a plaster mix in which portland cement or combinations of portland and masonry cements or portland cement and lime are the principle cementitious materials mixed with aggregate.ⁱ It is often referred to as stucco and is used worldwide in all climates, over a variety of substrates, as a building cladding material.

Assessing Cracks

Like all portland cement-based products, stucco is susceptible to occasional cracking. Most stucco cracks are extremely thin and are only a cosmetic concern. Called hairline cracks, they are not an indicator of an improper or compromised application. Stucco with an excessive quantity of cracks or with cracks that are abnormally wide in dimension should be investigated by a qualified individual.

Understanding Why Stucco Cracks

Because a stucco membrane gains strength over time, it is most likely to crack in the first few months after application. Unfortunately, this coincides with the time when the structure is settling. Stucco cracking is simply a form of stress relief as the stucco membrane is subjected to multiple stresses, such as:

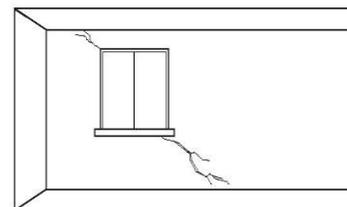
- Shrinkage stress as the stucco initially sets
- Building and ground settlement
- Seismic movement
- Wind loads and racking
- Structural loading (live and dead loads)
- Thermal expansion and contraction
- Warping, shrinkage and/or swelling of lumber or wood-based sheathing
- Vibrations from heavy equipment and/or ongoing construction

Occasionally, the cause of a crack is obvious. More often, however, multiple sources of stress exist and pinpointing the origin of a crack is difficult. Of all the stresses a stucco membrane endures, the applicator has control only over one: shrinkage stress.

Controlling Cracks

Control joints should be installed to minimize stress on the stucco membrane. In addition, the framing that supports the stucco must be designed and installed with limited deflection. Information on both subjects can be found in ASTM C1063.ⁱⁱ

The most common location for a crack is at the corner of window and door penetrations, where stresses concentrate. Known as a re-entrant crack, it can be controlled by the installation of control joints.



Re-entrant crack

Repairing Cracks

The following methods are recommendations that have been successful on projects for the repair of stucco cracks. Before starting a large remediation project, first repair a small-scale sample area to establish an acceptable standard of quality. Crack repair methods, identified herein, are not a guarantee a crack will not return, nor will they prevent future cracking.

Hairline Cracks – Cracks measuring 1/32 inch (.030 inch) and smaller in width are inherent in all cementitious materials including stucco and typically do not require treatment. Patching hairline cracks with aggregate material is not recommended as cracks of this size will not accept aggregate material and any patch will detract from the natural beauty of the stucco.

If the appearance of the crack is not acceptable, painting the surface is recommended. Force the paint into the cracks with a brush and follow with a coat of acrylic paint. An entire panel should be painted to achieve color uniformity. The thickness of the paint will affect the stucco texture and the color may not match existing integral colored stucco.

Shrinkage Cracks – May appear as web-like cracks in the surface coating. Often called craze or checking cracks, these usually appear during the curing process and are an aesthetic concern, not a functional problem. They can typically be addressed by refinishing the plastered surface or applying a thick coat of breathable acrylic paint.

Cracks larger than 1/32 inch (.030 inch) – Use a slurry coat of stucco finish and a bonding agent to patch cracks. Refinish the entire panel to prevent the appearance of a scar and to address any discontinuities with the existing texture.

When analysis determines that the stucco has cracked completely through the plaster membrane, the crack should be tooled out and repaired with a slurry coat and bonding agent mix that incorporates a bonding agent which will allow the patch materials to chemically bond with the existing plaster. Once the cracks are addressed, the entire panel should be refinished to eliminate the appearance of a patch.

Alternatively, an acrylic lamina can be created on the surface of the stucco. With this approach, a polymer-modified cement skim coat is applied over the entire plaster surface and a 4-5 oz. psy. fiberglass mesh is embedded into the wet skim coat. A finish coat material that is compatible with the polymer-modified base coat is applied as the final decoration. This method also adds crack resistance to the plaster assembly.

ⁱ ASTM International C11-18, *Standard Terminology Relating to Gypsum and Related Building Materials and Systems*, West Conshohocken, PA; ASTM International, 2018, www.astm.org

ⁱⁱ ASTM International C1063-19, *Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster*, West Conshohocken, PA; ASTM International, 2019, www.astm.org